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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

November 7, 1978

MEMORANDUM FOR: D. Eisenhut, Acting Assistant Director for S&P, DOR
FROM: G. Lainas, Chief, Plant Systems Branch, DOR
SUBJECT: ARKANSAS NUCLEAR STATION EVENT, SEPTEMBER 16, 1978

This memo provides a summary of the September 16, 1978 event which involved Arkansas Nuclear One Unit 1 and 2, and recommends that this event be reported as an Abnormal Occurrence.

On September 16, Unit 1, which was operating at power, tripped because of a failure of one of the main steam isolation valves and shut down as designed. Unit 2 was, at the time, in hot functional testing. The electrical power transient that resulted from the automatic shut down of Unit 1 affected Unit 2 through common offsite electrical switchgear and caused the initiation of Unit 2's ESF's and diesel generators. The ECCS pumps and containment sprays were actuated and flooding of the containment floor by water backing up through the sump occurred. This ECCS did not inject into the reactor system because the reactor system was at a operating pressure (about 2000 psi which is above the ECCS pump discharge pressure).

We discussed this matter with the licensee on September 21, 1978 again on September 22, 1978 and met with them and I&E on October 6, 1978. We have not as yet received an LER and I&E does not plan to report this event as an abnormal occurrence. In addition, DSS is taking action to restrict operation of the shared transformer.

The initiation of Unit 2's ECCS, containment sprays, and diesel generators was caused by several situations such as improper settings of a number of relays in the common station auto-transformer and Unit 2's inverters. Inadequate preoperational testing to check the settings of the relays was the cause. A major contributing factor to the station electrical upsets is the manner in which the shared startup transformer was operated. The shared transformer is sized to carry the emergency loads of one unit and the normal shut down loads of the other unit. However, the automatic transfer of the full auxiliary loads of both Unit 1 and Unit 2 onto the shared transformer, causes an overload condition and an attendant offsite

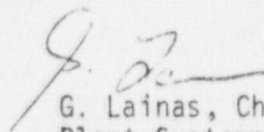
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power voltage degradation. In essence, these causes subjected Unit 2 to a degraded offsite power event concurrent with multiple inverter failures. The loss of the vital a.c. electrical power caused inadvertent initiation of all the ESF's and the Recirculation Actuation System, because there were multiple failures, i.e. more than a single failure, of the inverters. The Recirculation Actuation System was operated in such a way that the recirculation valves to the sump were opened and water from the refueling water storage tank flowed directly to the sump.

We believe that the event involved a major degradation of the engineered safety system related to the operation of the Recirculation Actuated System and as such, should be reported as an abnormal occurrence. If Unit 2 had been placed in operation and a LOCA postulated, the improper relay settings associated with the inverters would have resulted in actuation of the Recirculation Actuation System at a time when the ECCS should have been in the injection phase.

The cause of the event was due to improper settings of a number of relays because of an inadequate preoperation testing program. This resulted in multiple failures and could be considered common mode. We do not plan any action with other operating reactors but would recommend a circular emphasising the importance of preoperation testing.

Unit 1 operated as designed indicating that the relays are set properly. However, in reviewing this event with the applicant subsequent to October 6, 1978, and as part of our review of the licensee's proposal to improve Unit 1's grid undervoltage capability, we found that Unit 1's electrical system was inadequate. Sequencing of the ECCS loads is necessary to prevent undervoltage to the vital buses. Sequencing was proposed as a partial fix to the generic grid undervoltage concern, which is under review. However, because of the seriousness of the situation, the licensee installed sequencing features on October 31, 1978.



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